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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] high [which raises the visibility of displays, such as a cathode-ray tube (CRT) and electroluminescence (EL), as for this invention] -- it is related with the display and the organic electroluminescence display using brightness circular polarization of light film and this.

[0002]

[Description of the Prior Art] A circular polarization of light film begins CRT, and is used as an acid-resisting filter of a spontaneous light type display. The electrode which begins to take especially an organic EL device in advance as a light emitting device among one pair of electrodes (an anode plate and cathode), and is located in a field (luminescence side) side consists of transparence thru/or a translucent thin film in order to raise optical ejection effectiveness. On the other hand, it begins to take in advance and the electrode of an opposite hand serves as a field from a specific metal thin film. This metal thin film has the high reflection factor of the light, irrespective of the time of luminescence of an organic EL device, and nonluminescent, a part of light which carried out incidence to the organic EL device from the exterior is reflected by the counterelectrode, it is begun to take it in advance, and outgoing radiation is carried out from a field.

[0003] Stopping the light reflected by this electrode can be easily suppressed by using the conventional circular polarization of light film. Using a circular polarization of light filter for an organic EL device is indicated by JP,7-142170,A.

[0004] However, by using a polarization film, loss of the light more than one half occurred, and it had become the cause of falling luminous efficiency substantially.

[0005]

[Problem(s) to be Solved by the Invention] A circular polarization of light filter can cut that carry out incidence to an organic EL device from the exterior, and the light reflected with the metal thin film electrode carries out outgoing radiation from an optical extraction side again. However, falling has been a technical problem by the optical absorption nature in which a polarization film has the luminous efficiency from an organic EL device itself. decline in the luminous efficiency of an organic EL device - - stopping -- in addition -- and the high brightness circular polarization of light filter which suppresses lowering of the visibility by the echo of outdoor daylight is required.

[0006] high [which raises the visibility of a display in order that this invention may solve said conventional problem] -- it aims at offering the display and the organic electroluminescence display using brightness circular polarization of light film and this.

[0007]

[Means for Solving the Problem] The high brightness circular polarization of light film of this invention which attains the above-mentioned object is characterized by including the polarizing element which dyed the dichroism matter, the unabsorbent polarizing element which has the polarization isolation by an echo or dispersion, and a birefringence layer (one layer or two or more layers).

[0008] As for the non-absorbing mold polarizing element which has the polarization isolation by echo,

in the above, it is desirable that it is the circular polarization of light selective reflection of a cholesteric-liquid-crystal polymer.

[0009] In the above, moreover, the non-absorbing mold polarizing element which has the polarization isolation by dispersion In the direction in which it consists of translucency resin which comes to carry out distributed distribution of the minute field from which a birefringence property is different, and the shaft orientations which show the maximum permeability of the linearly polarized light, and the refractive-index difference of the translucency resin and minute field cross at right angles In the shaft orientations of the or more 0.03 0.5 (**n1) or less and the maximum permeability, it is desirable that they are at least one or more sheets about the film which is less than 0.03 (**n2).

[0010] Moreover, as for the polarizing element which comes to use the dichroism matter, in the above, it is desirable that it is the spreading mold polarizing element to which orientation of the dichroism matter was carried out using the orientation of the liquid crystallinity matter.

[0011] Moreover, as for a birefringence layer, in the above, it is desirable that it is the spreading mold birefringence film to which it comes to carry out orientation of the liquid crystal polymer.

[0012] Next, the indicating equipment of this invention is characterized by equipping the check-by-looking side of a spontaneous light type display with one of the aforementioned high brightness circular polarization of light films.

[0013] Next, the organic electroluminescence display of this invention is characterized by equipping the check-by-looking side of an organic electroluminescent element with one of the aforementioned high brightness circular polarization of light films.

[0014]

[Embodiment of the Invention] In this invention, it is carrying out incidence of the luminescence from an organic EL device to a non-absorbing mold circular polarization of light component first, and polarization separation by an echo, dispersion, etc. is performed and it separates into an effective polarization component and an un-validity polarization component. Incidence of the effective polarization component is carried out to the absorption mold polarizing element which comes to use the dichroism matter. Moreover, again, an un-validity polarization component is returned by an echo and dispersion into the cavity of an organic EL device, and when it is changed into an effective polarization component by polarization conversion by echo or is changed into an unpolarized light basis component by depolarization etc., it can be changed into again effective light by them.

[0015] The polarization separation which used the reflection factor anisotropy using the circular polarization of light isolation of cholesteric liquid crystal and a refractive-index anisotropy, the dispersion anisotropy, and the BURYU star angle as a non-absorbing mold polarizing element using an echo and dispersion is mentioned.

[0016] Next, the example of the combination of a non-absorbing polarizing element and an absorption mold polarizing element is illustrated.

[0017] Drawing 1 is a typical outline sectional view which consists of the polarizing element (absorption mold polarizing element) 1, and the $\lambda/4$ birefringence film 2 which comes to use the dichroism matter, and the cholesteric-liquid-crystal polymer films (Ch-LCP layer) 3 of one example of this invention.

[0018] As a polarizing element 1 which comes to use the dichroism matter, dichromatic dye and iodine are dyed a polyvinyl alcohol (PVA) film, and the polarization film extended about 2 to 10 times in the boric-acid water solution is mentioned. For example, NITTO DENKO NPF is mentioned.

[0019] Furthermore, it is obtained by carrying out orientation of the liquid crystal and/, or the liquid crystal polymer which comes to contain a dichroic color. As liquid crystal and a liquid crystal polymer, there is especially no definition and a nematic mold and smectic mold, a cholesteric mold, disco tic molds and these forward ingredients, and a negative ingredient are used. The polarizing element obtained by the proper thing to do for base material film finishing cloth may be used using the lyotropic liquid crystal made from OPUTIBA etc.

[0020] As $\lambda/4$ birefringence film 2, broadband $\lambda/4$ root which is the birefringence film which has the phase contrast delay of the quarter-wave length of light wavelength, and has the phase

contrast of quarter-wave length widely in a light field may be used. Generally broadband $\lambda/4$ plate is realizable in the combination of the birefringence film which has a different phase contrast value. Moreover, a drawing and the thing which carried out orientation are mentioned to a phase contrast film in a high polymer film. Although especially definition does not have the high polymer film used for a phase contrast film, it is optically transparent and what has few orientation nonuniformity is used suitably. For example, a polycarbonate, polyarylate, polysulfone, a polyolefine system, polyethylene terephthalate, polyethylenenaphthalate, a norbornene system, acrylic, a polystyrene system, and a cellulose type are mentioned. You may coat or sink a liquid crystal constituent into a high polymer film.

[0021] As a cholesteric-liquid-crystal polymer film 3, what has selective reflection to a light field is desirable, and the two or more layers cholesteric-liquid-crystal polymer layer which has selective reflection which is different since it has selective reflection in a larger light field may be compounded.

[0022] In addition, it is desirable to stick in combination from which the transmitted light becomes max about the lamination include angle of an absorption mold polarizing element, $\lambda/4$ birefringence film, and a cholesteric-liquid-crystal polymer film.

[0023] Moreover, drawing 2 and 3 are typical outline sectional views which consist of the polarizing element (absorption mold polarizing element) 1, and the $\lambda/4$ birefringence film 4 which comes to use the dichroism matter, and the anisotropy dispersion films 5 of another example of this invention.

[0024] About the polarizing element 1, and the $\lambda/4$ birefringence film 4 which comes to use the dichroism matter, it is as common as the above-mentioned thing.

[0025] It consists of translucency resin which comes to carry out distributed distribution of the minute field from which a birefringence property is different about the anisotropy dispersion film 5, and in the direction in which the shaft orientations which show the maximum permeability of the linearly polarized light, and the refractive-index difference of the translucency resin and minute field cross at right angles, in the shaft orientations of the or more 0.03 0.5 (n_1) or less and the maximum permeability, it designs so that it may be less than 0.03 (n_2).

[0026] About the very small field from which there is especially no definition about translucency resin, and a birefringence property is different, it is desirable that it is within the limits whose path of n_1 direction is 0.05 micrometers - 50 micrometers.

[0027] In drawing 2 and 3, although the combination from which the case where it sticks in combination from which the transmitted light becomes max about the lamination include angle of an absorption mold polarizing element, $\lambda/4$ birefringence film, and an anisotropy dispersion component, and the transmitted light become min (dispersion is max) can be considered, it is desirable to choose from the luminescence reinforcement of an organic EL device and a viewpoint of the acid-resisting effectiveness suitably.

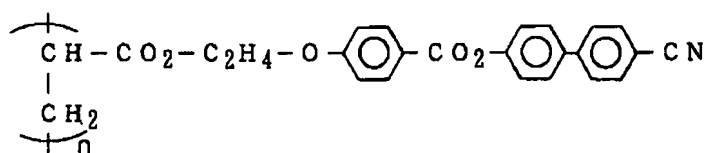
[0028]

[Example] This invention is explained still more concretely using an example below. In addition, this invention is not limited to the following example.

[0029] (Example 1) NITTO DENKO NPF-HEG1425DU was used as an absorption mold polarizing element. Thickness was 180 micrometers. Moreover, as $\lambda/4$ birefringence film, the drawing (vertical 1 shaft drawing) of the norbornene system resin film (ARTON made from JSR (trade name)) was carried out 1.5 times at 180 degrees C, and it adjusted so that it might be set to $n_d=135\text{nm}$ on the wavelength of $\lambda=550\text{nm}$. Thickness was 90 micrometers. Stirring mixing of the polymer liquid crystal 50 section expressed with the 20-% of the weight dichloromethane solution containing the norbornene system resin (product [made from JSR], ARTON) 950 section (it is the same the weight section and the following) and a bottom type (n_1) as an anisotropy dispersion film was carried out, and the film with a thickness of 70 micrometers was obtained by the solvent cast method. After carrying out drawing processing of the film 3 times at 18 degrees C, it quenched and n_2 formed [refractive-index difference n_1] the optical film of 0.029 by 0.230.

[0030]

[Formula 1]



[0031] When the minute area size of the liquid crystallinity thermoplastics which is carrying out distributed distribution by coloring by phase contrast using the polarization microscope was estimated, it was 5 micrometers in the pitch diameter of π direction. Incidentally, the load deflection temperature of norbornene system resin is 165 degrees C, and glass transition temperature is 182 degrees C. The glass transition temperature of liquid crystallinity thermoplastic resin was 80 degrees C, and the liquid crystal temperature requirement was 100 degrees C - 290 degrees C.

[0032] The include angle which makes an absorption mold polarizing element, an absorption shaft, and the drawing shaft of a birefringence film combined so that it might become 45 degrees, and so that an anisotropy dispersion film might become an absorption shaft and parallel about the dispersion direction.

[0033] The configuration of a cross section is as being shown in drawing 2, and each film carried out adhesion unification with the acrylic pressure-sensitive binder.

[0034] (Example 2) NITTO DENKO NPF-HEG1425DU was used as an absorption mold polarizing element. Moreover, as $\lambda/4$ birefringence film, the drawing (vertical 1 shaft drawing) of the norbornene system resin film (ARTON made from JSR) was carried out 1.5 times at 180 degrees C, and it adjusted so that it might be set to $n_d=135\text{nm}$ on the wavelength of $\lambda=550\text{nm}$.

[0035] As a non-absorbing mold polarizing element which has polarization isolation, the 3-micrometer poly vinyl alcohol orientation film was formed on the 80-micrometer triacetyl cellulose film, and after carrying out rubbing processing, the main wavelength of selective reflection formed the 550nm cholesteric-liquid-crystal polymer.

[0036] At 45 degrees, the include angle to make combined [the transmitted light] the absorption mold polarizing element, the absorption shaft, and the drawing shaft of a birefringence film so that it might become max. Moreover, the cholesteric-liquid-crystal polymer layer was combined in the arbitrary directions.

[0037] The configuration of a cross section is as being shown in drawing 2, and each film carried out adhesion unification with the acrylic pressure-sensitive binder.

[0038] (Example 1 of a comparison) NITTO DENKO NPF-HEG1425DU was used as an absorption mold polarizing element. Moreover, as $\lambda/4$ birefringence film, the drawing (vertical 1 shaft drawing) of the norbornene system resin film (ARTON made from JSR) was carried out 1.5 times at 180 degrees C, and it adjusted so that it might be set to $n_d=135\text{nm}$ on the wavelength of $\lambda:550\text{nm}$.

[0039] The absorption mold polarizing element, the absorption shaft, and the drawing shaft of a birefringence film were combined so that the include angle to make might become 45 degrees.

[0040] White brightness and black brightness were measured using the low-molecular organic EL device of <assessment> marketing. A result is shown in a table 1.

[0041]

[A table 1]

	実施例 1	実施例 2	比較例 1
白輝度 (cd/m ²)	4 2	4 9	3 2
黒輝度 (cd/m ²)	1 . 2	1 . 0	0 . 8
コントラスト比	3 5	4 9	4 0

[0042] Although contrast fell a little in the example 1 the passage clear from a table 1, white brightness improved two times m by 10cds /. White brightness and contrast improved in the example 2. On the other hand, the example 1 of a comparison had the problem that white brightness important for a display was low.

[0043]

[Effect of the Invention] high [which raises the visibility of a display by considering this invention as

the configuration containing the polarizing element which dyed the dichroism matter, the unabsorbent polarizing element which has the polarization isolation by an echo or dispersion, and a birefringence layer (one layer or two or more layers) as explained above] -- the display and the organic electroluminescence display using brightness circular polarization of light film and this can be offered.

[Translation done.]

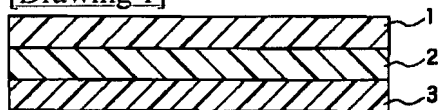
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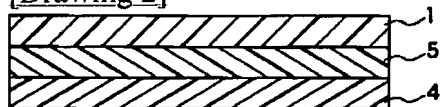
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DRAWINGS

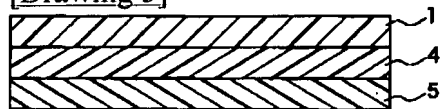
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]